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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/996,244

11/28/2001

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594826-001

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03/30/2010

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EXAMINER

PALABRICA, RICARDO J

ART UNIT

PAPER NUMBER

3663

MAIL DATE

DELIVERY MODE

03/30/2010

PAPER

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte DANIEL RICHARD SCHAEFER
and
JAMES MICHAEL SNEAD

Appeal 2009-000218
Application 09/996,244
Technology Center 3600

Decided: March 30, 2010

Before: LEE E. BARRETT, MURRIEL E. CRAWFORD, and
JOHN C. KERINS, *Administrative Patent Judges.*

CRAWFORD, *Administrative Patent Judge.*

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134(a) (2002) from a final rejection of claims 1 to 8, 10 to 14, 16 to 19, 29, 33, and 34. We have jurisdiction under 35 U.S.C. § 6(b) (2002).

We AFFIRM-IN-PART.

STATEMENT OF THE CASE

The claimed invention is directed to a fullerene molecule having one or more thermal neutrons trapped within the cage-like structure of the fullerene molecule (Spec .1).

Claim 1 under appeal reads as follows:

1. A fullerene molecule having one or more free thermal neutrons trapped within the cage-like structure of said fullerene molecule.

The evidence relied upon by the Examiner in rejecting the claims on appeal is:

Board Decision (Appeal No. 1999-1059, Serial No. 08/376,846, mailed Sep. 28, 2001);

Charles D. Hodgman et al., *Handbook of Chemistry and Physics*, 450-69, 472-73, 478-83, 488-89, 494-95, 500-01 (1961);

Beta Emitters by Half-Life and Energy, Nucleonics, 70 (Feb. 1961);

Boltz et al., *CRC Handbook of Tables for Applied Engineering Science*, 390 (1970);

Yu Yu Kosvintsev et al., *Possible Use of Wall Traps and Magnetic Traps of Ultra-Cold Neutrons for Measuring the Lifetime of the Free Neutron*, 20 Instruments and Experimental Technique, 43-45 (1977);

H.A. Jiménez-Vázquez et al., *Hot-atom incorporation of tritium atoms into fullerenes*, Chemical Phys. Letters, 111-14 (Oct. 1994); and

Tibor Braun et al., *Endohedral incorporation of argon atoms into C₆₀ by neutron irradiation*, Chem. Phys. Letters, 443-47 (1995).

The Examiner rejected claims 1 to 8, 10 to 14, 16 to 19, 29, 33, and 34 under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement.

The Examiner rejected claims 4 to 8, 10 to 14, and 16 to 19 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Appellants regard as their invention.

ISSUES

Did the Examiner err in holding that the Appellants' Specification fails to enable a person of ordinary skill in the art to make and use the invention?

Did the Examiner err in holding that claims 4 to 8, 10 to 14, and 16 to 19 are indefinite?

FINDINGS OF FACT

In an earlier Decision (Appeal 1999-1059, for Application Serial No. 08/376,846, entered Sep. 28, 2001), a merits panel of the Board held that the Examiner had a reasonable basis to question the enablement of the invention. The previous Board panel found that the evidence presented by the Appellants in the form of the first Declaration of Joseph W. Talnagi did not establish that beta emitters in the fullerene molecule were thermal neutrons rather than other pure beta emitters. In addition, the panel found that the evidence submitted by the Appellants did not establish that the thermal neutrons, if present, were within the fullerene molecule cage and

were not bonded to fullerene itself or in the sample outside of the fullerene. This previous panel concluded that the claims on appeal did not satisfy the requirements of 35 U.S.C. § 112, first paragraph.

Appellants have filed a second Declaration of Joseph W. Talnagi to address the matters found lacking in the first Declaration of Joseph W. Talnagi.

Appellants' Specification discloses that free normal neutrons are trapped in isolation within the molecular cage of a fullerene (Spec. 4). The Specification discloses that thermal neutrons are captured in the fluorine molecule by irradiating the fullerene molecule in a thermal neutron flux at a steady-state thermal power of 10 to 500 kW for about 5 to 15 minutes (Spec. 5). The Specification further discloses that thermal neutrons are capable of being released from the fullerene at a location removed from the source of the neutrons by disassembling the fullerene molecule using a laser, an electric field, magnetic field, non-coherent electromagnetic radiation, particle bombardment, pressurization, mechanical force, heat, chemical reaction, electric current, or by using any combination of such means (Spec. 3 to 4). The neutron-containing fullerene molecule can also be made to impinge upon a thin metal foil which prevents penetration by the fullerene molecule but allows the neutron to pass through (Spec. 4). The neutron will remain entrapped in the fullerene molecule until such time as it naturally decays into a proton or combines with a proton, the neutron transforms into an anti-neutron via natural neutron/anti-neutron oscillation with subsequent decay of the anti-neutron into an anti-proton and a neutrino or until the fullerene molecule is made to release the neutron (Spec. 5). The neutrons captured within the fullerene may be accelerated to energy levels that do not

occur naturally by placing an electrical charge on the fullerene molecule and then accelerating the charged molecule containing the neutron in a particle accelerator (Spec. 5 to 6). The neutrons can then be released from the fullerene molecule to thereby release a uniform beam of very high energy neutrons. Experimentally derived neutron decay half-life, based upon experimentation undertaken in conjunction with the development of the present invention, is approximately 10 minutes (Spec. 3).

The Specification further discloses that evidence that neutrons are trapped in the fullerene molecule consists of the presence of pure beta emitters in the fullerene that remain after the counts resulting from the gamma emitters have been stripped from the raw data (Spec. 9).

The second Declaration of Joseph W. Talnagi states that he carried out the procedures outlined at pages 7 to 10 of the current application wherein a fullerene sample is placed in a neutron flux within a nuclear reactor and irradiated at a steady-state thermal power between 10 and 500 kilowatts for a period of about 5 to 15 minutes and obtained a fullerene sample exhibiting a beta emission with a half life of about 10 minutes plus or minus one minute (Sec. Decl. 1). Mr. Talnagi further declares that the fullerene used for the experiment was carefully analyzed and none of the isotopes which are also beta emitters having a half-life in the range of 6 to 15 minutes, or their sister isotopes, were present. The Declaration concludes that, “the only beta emitter that I have been able to identify that would produce the beta emission I observed for the fullerene is a thermal neutron.” (Sec. Decl. 2). The Declaration also states that given this small sample size, the velocity of a thermal neutron and its mean free path in the materials comprising the test samples, a neutron will either escape from the confines of the sample and

thereby be lost to detection or it will interact with the nuclei of the atoms forming the sample. The Declaration therefore concludes that it is unlikely that a free thermal neutron would externally attach itself to an atom or molecule in a manner analogous to a chemical bond. The Declaration further states that based upon the analysis that was done, a person skilled in the art would conclude that a thermal neutron was captured in the central cavity of the fullerene molecule.

PRINCIPLES OF LAW

Enablement

An analysis of whether the claims under appeal are supported by an enabling disclosure requires a determination of whether that disclosure contained sufficient information regarding the subject matter of the appealed claims as to enable one skilled in the pertinent art to make and use the claimed invention. The test for enablement is whether one skilled in the art could make and use the claimed invention from the disclosure coupled with information known in the art without undue experimentation. *See United States v. Telectronics, Inc.*, 857 F.2d 778, 785 (Fed. Cir. 1988); *In re Stephens*, 529 F.2d 1343, 1345 (CCPA 1976).

In order to make a rejection, the examiner has the initial burden to establish a reasonable basis to question the enablement provided for the claimed invention. *See In re Wright*, 999 F.2d 1557, 1561-62 (Fed. Cir. 1993) (examiner must provide a reasonable explanation as to why the scope of protection provided by a claim is not adequately enabled by the disclosure). A disclosure which contains a teaching of the manner and process of making and using an invention in terms which correspond in

scope to those used in describing and defining the subject matter sought to be patented must be taken as being in compliance with the enablement requirement of 35 U.S.C. § 112, first paragraph, unless there is a reason to doubt the objective truth of the statements contained therein which must be relied on for enabling support. Assuming that sufficient reason for such doubt exists, a rejection for failure to teach how to make and/or use will be proper on that basis. *See In re Marzocchi*, 439 F.2d 220, 223 (CCPA 1971). As stated by the court,

it is incumbent upon the Patent Office, whenever a rejection on this basis is made, to explain why it doubts the truth or accuracy of any statement in a supporting disclosure and to back up assertions of its own with acceptable evidence or reasoning which is inconsistent with the contested statement. Otherwise, there would be no need for the applicant to go to the trouble and expense of supporting his presumptively accurate disclosure.

Marzocchi, 439 F.2d at 224.

Once the examiner has established a reasonable basis to question the enablement provided for the claimed invention, the burden falls on the appellant to present persuasive arguments, supported by suitable proofs where necessary, that one skilled in the art would be able to make and use the claimed invention using the disclosure as a guide. *See In re Brandstadter*, 484 F.2d 1395, 1406 (CCPA 1973). In making the determination of enablement, the examiner shall consider the original disclosure and all evidence in the record, weighing evidence that supports enablement¹ against evidence that the specification is not enabling.

¹ The Appellants may attempt to overcome the Examiner's doubt about enablement by pointing to details in the disclosure but may not add

Indefiniteness

Claims are considered to be definite, as required by the second paragraph of 35 U.S.C. § 112, when they define the metes and bounds of a claimed invention with a reasonable degree of precision and particularity. *See In re Venezia*, 530 F.2d 956, 958, 189 USPQ 149, 151 (CCPA 1976).

ANALYSIS

Enablement

We will not sustain this rejection because in our view, the Appellants have submitted evidence sufficient to establish that a person of ordinary skill in the art would have been able to make and use the claimed invention. The Second Declaration of Joseph Talnagi is evidence that a person of ordinary skill in the art would know how to entrap a thermal neutron in a fullerene molecule and ensure that the thermal neutrons are captured therein. Specifically, the Declaration states that the procedure disclosed in the Specification was followed, i.e., a fullerene molecule was placed in a neutron flux within a nuclear reactor and irradiated at a steady-state thermal power between 10 and 500 kW for a period of about 5 to 15 minutes. Mr. Talnagi obtained fullerene samples exhibiting beta emission with a half life of about 10 minutes. An analysis was done to rule out the presence of other beta emitters having a half life near the half life of a thermal neutron. In addition, Mr. Talnagi states that it is unlikely that the thermal neutrons have bonded with the fullerene molecule. Mr. Talnagi states that the thermal

new matter. The Appellants may also submit factual affidavits under 37 C.F.R. § 1.132 (2009) or cite references to show what one skilled in the art knew at the time of filing the application.

neutrons would either be absorbed by the atomic nuclei which render the thermal neutron incapable of decaying with an approximately ten minute half life or escape from the sample and thus not be detectable by its beta decay. Mr. Talnagi lastly states that a person of ordinary skill in the art would conclude that a thermal neutron was captured within the fullerene molecule.

We conclude that the second declaration of Mr. Talnagi is sufficient to rebut the Examiner's case of lack of enablement.

In regard to the Examiner's argument that there is no disclosure of what causes a neutron from a beam of irradiating thermal neutrons to penetrate only one wall of the fullerene and to not penetrate, contact, or be absorbed in the fullerene, we agree with the Appellants that a patent applicant is under no obligation to prove the scientific principle upon which his or her invention works. *In re Cortright*, 165 F.3d 1353, 1359 (Fed. Cir. 1999).

Indefiniteness

We will sustain the Examiner's rejection of claims 4 to 8, 10 to 14, and 16 to 19 under 35 U.S.C. § 112, second paragraph.

Claim 4 recites that the neutrons of claim 1 are accelerated to an elevated energy and claim 5 recites that the fullerene molecule is provided with an electrical charge. The recitations in these claims are a mixture of product limitations and method limitations. As such, the claims are ambiguous and thus do not define the metes and bounds of the invention with a reasonable degree of precision and particularity.

We agree with the Examiner that claims 6, 8, 10 to 14, and 16 to 19 are indefinite. It is not clear upon reading these claims what is being claimed. For example, claim 6 recites that the neutrons of claim 1 are capable of creating a uniform beam of thermal neutrons and claim 8 recites that the neutrons of claim 1 are capable of being released from the fullerene molecule as a uniform beam of free thermal neutrons. It is not clear from these two claims whether Appellant is claiming the fullerene molecule itself or the formation of a uniform beam. In this regard, it is not clear how the formation of a uniform beam can structurally limit the claims. Claims 12, 14, 18 and 19 include similar confusing recitations.

Claim 7 recites that the thermal neutrons of claim 1 are useful as an irradiation target for bombardment of other particles. We agree with the Examiner that this claim recites a use of the fullerene molecule and as such is indefinite.

CONCLUSION OF LAW

On the record before us, the Examiner erred in rejecting claims 1 to 8, 10 to 14, 16 to 19, 29, 33, and 34 under 35 U.S.C. § 112, first paragraph, and the Examiner did not err in rejecting claims 4 to 8, 10 to 14, and 16 to 19 under 35 U.S.C. § 112, second paragraph.

DECISION

The Examiner's rejection under 35 U.S.C. § 112, first paragraph, is reversed, and the rejection under 35 U.S.C. § 112, second paragraph, is affirmed.

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No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv) (2007).

AFFIRMED-IN-PART

hh

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